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BLACK SPOT OF ELM

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Of the various leaf spots of elm, black spot caused by Gnomonia ulmea (Schw.) Thum. (imperfect state, Gloeosporium ulmeum Miles) is the most important and can materially injure a tree by causing premature defoliation and loss of vigor (9,11). Repeated severe seasonal attacks by the fungus may result in death of a tree or weaken it so that it is not able to withstand adverse climatic conditions. Young trees are more seriously injured than older ones (11). Black spot of elm (also known as elm leaf spot, scab, and anthracnose) occurs in most states east of the Rocky Mountains (1,4, 6,7,10,11,13,16,17) and in Canada (3,5,11,13).

The host range of elms includes Florida's native elms: Ulmus alata Michx. (winged or wahoo elm); U. americana L. var. floridana (Chapm.) Little (Florida elm); and U. rubra Muhl. (slippery elm); and its introduced elm species: U. pumila L. (Siberian elm); U. parvifolia Jacq. (Chinese or evergreen elm); in addition to U. americana L. var. americana (American elm); U. campestris Mill. (English elm); U. carpinofolia Gleditsch (smooth-leaved elm); U. crassifolia Nutt. (cedar elm); U. glabra Huds. (scotch elm); U. hollandica. Mill. (Dutch elm); U. grocera Salisb. (English elm); U. racemosa Thomas and Borkh. (rock or cork elm); U. thomasii Sarg. (rock or cork elm); and U. serotina Sarg. (4,6,9,10,11,13,16,17,18,19). American elm, the most common species in the northern hemisphere (11), appears to be the principal host of Gnomonia ulmea (4,6,9,11,19), and the disease is coextensive with this host (11,13). Black spot of elm has never been seen or reported in any foreign country; hence, the fungus appears to be strictly an American species (11).

The life cycle (11,13) of Gnomonia ulmea begins with the overwintering stage which occurs as perithecia on dead fallen leaves. The perithecia (fruiting bodies of the perfect state) contain ascospores which mature in winter and are forcibly ejected 3-4 mm into the air in the spring during alternate wetting and drying of the dead leaves

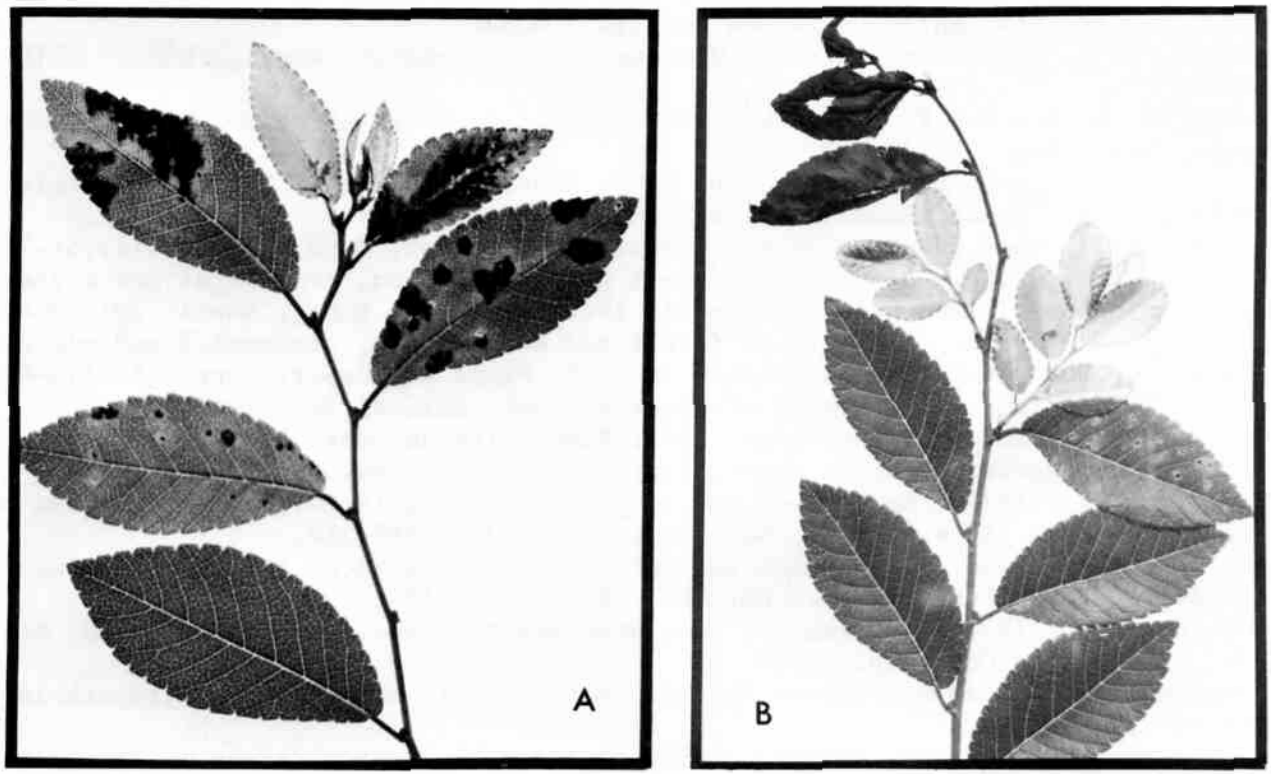

Fig. 1. Black spot of Chinese elm, Ulmus parvifolia, caused by Gnomonia ulmea (Schw.) Thum. A) black, leaf spots; B) tip dieback.

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over several days of 7 C (45 F). Ascospore discharge is usually synchronous with the inception of new growth of the host (1,13). Ascospore-initiated infections lead to the development of acervuli which are black, and up to 3 mm in diam. The acervulus is the asexual, conidial-producing state of the fungus. Upon maturation, the leaf cuticle splits irregularly, extruding small white masses of spores (11,14,19) which are disseminated by rain and can cause successive waves of foliar infection during rainy periods (13) and extended periods of heavy dew (16). Perithecia develop in the fallen leaves and begin the life cycle anew.

SYMPTOMS. The first symptoms of black spot occur as whitish or yellow flecks (ascospore-initiated infections) on the upper surface of newly unfolded leaves closest to the ground. As the whitened spots enlarge in size, black specks occur within these areas and coalesce into a single, irregular, coal-black, subcuticular, stromatic structure which is surrounded by a narrow band of whitish dead tissue. Petioles and young, green branch tips are also susceptible resulting in the killing of new shoots (8,11,13,16). Spots are limited in number and size on adult or mature foliage (14).

CONTROL. Fallen leaves should be gathered and burned in the fall to reduce overwintering inoculum (1,5,12,14). Crowded conditions that inhibit good air circulation should be avoided (16). Pruning of affected parts prior to chemical control treatments (disinfesting tools between cuts) and also aids in disease control (2). Though copper in the form of Bordeaux mixture (14,15,16) and various forms of sulfur (16) have been used with some success for control of this disease, these materials may be phytotoxic under Florida conditions. An early, thorough application of Benlate, repeated as necessary, and avoidance of overhead irrigation where applicable, is recommended for Florida conditions (12).

Literature Cited

1. Anonymous. 1934. Elm diseases. N. J. Agric. Exp. Sta. Circ. 308. 2p.
2. Carter, J. C. 1939. Progress in the control of elm diseases in nurseries. Biol. Notes 111. Nat. Hist. Surv. 1939. 10:1-19.
3. Davidson, A.G. 1956. Annual report of the forest insect and disease survey. Can. Dept. Agric. 1955. 106p.
4. Hepting, G. H. 1971. Diseases of forest and shade trees of the United States. USDA Forest Serv. Agric. Handbook No. 386. 658p.
5. Howitt, J. E. 1925. Some notes on diseases new to Ontario. Phytopathology 15(5): 300.
6. Johnston, C. 0., and T. E. Brooks. 1938. Kansas mycological notes, 1937. Trans, Kans. Acad. Sci. 41:121-123.
7. _____, C. L. Lefebvre, and E. D. Hansing. 1938, Kansas mycological notes, 1936. Trans. Kans. Acad. Sci. 40:69-74.
8. L.D.H. 1931. Some diseases of elm trees. Missouri Bot. Card. Bull, 19(4):61-74.
9. Martin, G. H. 1923. Diseases of forest and shade trees, ornamental and miscellaneous plants in the United States in 1922. Plant Dis. Reptr, Suppl, 29:393-461,
10. _____. 1926. Diseases of forest and shade trees, ornamental and miscellaneous plants in the United States in 1925. Plant Dis. Reptr. Suppl. 50:413-478.
11. Miles, L. E. 1921. Leaf spots of the elm. Bot. Gaz. 71(3);161-196.
12. Mullin, R. S., and T. A. Kucharek. 1971. Plant disease control guide. Institute of Food and Agricultural Sciences, Fla. Agric. Ext. Serv. Univ. Fla.
13. Pomerleau, R. 1937. Recherches sur le Gnomonia ulmea (Schw.) Thum. Cstudies on Gnomonia ulmea (Schw.) Thum.I] Nat. Can. 64:261-289, 297-318.
14. _____. 1938. Recherches sur le Gnomonia ulmea (Schw.) Thum. [^Studies on Gnomonia ulmea (Schw.) Thum.H Nat. Can. 65:23-41, 253-279.
15. Rankin, W. H. 1932. Spraying for leaf diseases of trees. Proc. Eighth Ann. Mtg. Nat. Shade Tree Conf. p. 64-69.
16. Trumbower, J. A. 1934. Control of elm leaf spots in nurseries. Phytopathology 24:62-73.
17. U. S. Department of Agriculture. 1960. Index of plant diseases in the United States. Agric. Handbook No. 165. 531p.
18. Wehlburg, C., S. A. Alfieri, Jr., K. R. Langdon, and J, W. Kimbrough. 1975. Index of plant diseases in Florida. Fla. Dept. Agric. and Consumer Serv., Div. Plant Ind. Bull. 11. 285p.
19. Wehmeyer, L. E. 1975. The pyrenomycetous fungi. J. Cramer. Leutershausen, Germany. 25Op.